

## Todd Allen, Wisconsin professor, becomes new ATR User Facility director

Todd Allen, professor of engineering physics at the University of Wisconsin-Madison, is the new scientific director at the Advanced Test Reactor National Scientific User Facility. During his initial visit to INL after his selection, he sat down to talk about his views of and goals for the NSUF.

Q: What are your thoughts on being selected as director of the ATR NSUF?

TA: Well, a couple thoughts. First, I'm excited to be part of the facility. I think it's a great opportunity for the laboratory to engage with universities and industries and the greater national and international R&D community. I think it will be a great focal point for people to come here and work, so I'm excited about the job. I think it's a great opportunity to promote the lab and nuclear energy in the U.S.

I'm also honored that the lab picked me. I like the fact that they put that trust in me to do the job.

Q: What role do you see in developing the User Facility and get it moving?

TA: If I had to describe how I'll do my job, it's to set the context, to get people excited about using the facility and interacting and engaging with Idaho National Lab. I think I'd like to push three separate themes.

One is the need to have a long-term plan, to make sure that as we have the opportunity to get new capital equipment and new examination-type facilities that we understand what needs are out there and what the users want and to put the right equipment in place to attract people to our facilities.

If you go out to university research community, you'll find a lot of people who are doing nonradioactive type work. INL has a lot of very interesting tools that are not necessarily applied to the study of fuels and materials in nuclear systems. We have this potential to improve our research infrastructure to where it's as cutting-edge as possible. Frankly, I think it would be great if people wanted to come and use our facilities just because they are so good, even without a nuclear reactor.

But the big bonus is that we do have the Advanced Test Reactor and we can, in a very controlled manner, put neutrons on a sample and learn things you can only learn if you have a nuclear reactor. If you combine those two things, we're in a great position. So, that is theme one - make sure we are staffed and equipped to be the best in the world.

Second, I'd really like to attract people to come here and view the User Facility as a place to come and engage their intellectual curiosity. I would like to have unique speakers come here just so people throughout the laboratory can hear what some interesting university or industry researchers are doing and to think about how outside research could be used to advance reactor technology.

And third, I think this facility gives a great opportunity to engage INL staff with other researchers. I don't really want the User Facility to be this magic black box where someone from a university has this clever idea, they submit it, get it approved, then some unknown people here at INL do some stuff, some data comes out and the universities are happy.

I think it's really got to be a true partnership between the laboratory staff and the universities where they are writing joint papers, where it's really viewed as a team approach. So, if we're properly equipped and bring people here just because it's an exciting place facilitating interesting discussions and developments and where interesting inventions are being made, and at the same time our staff is just as critical as the outside users, that makes it a success.

Q: Are there any other national user facilities that you are looking to model after?

TA: Luckily for me, in the past, I have interacted with some user facilities. So there are things that they do which I really like.

I don't like the idea that a university researcher proposes a specific project and then a person here does all the work. I like it better that when you write your proposal, you've already identified your partner ahead of time. You've said I want to use your facility, and I want to work with John Smith because John Smith is the world expert in this area and together we can do great things. I really like that framework.

I like the user facilities that are good about meeting their commitments - if they say they are going to do something, they get it done on time. So, I do want to use things that I've learned from others.

I also think we're in a position where we should partner with other user facilities. There are user facilities around the country that are absolutely unique, for instance the Advanced Proton Source at Argonne (National Laboratory). It's a billion-dollar machine that we're never going to get at INL, but on the other hand, they have the ability to put high intensity X-ray microbeams on sources and learn things. They're not really that engaged at the moment in looking at things from a reactor facility, but you can look at a number of user facilities around the country where we may be able to collaborate and take advantage of the things they do well and what we do well.

In my mind, we have to figure out our priorities, get our first experiments set up and be a success. Then we can start having those discussions with other user facilities. If I can figure out a way to do that on experiment one, great.

**"By selecting a university professor as director . . . (INL) is sending a very strong signal to the university community that it wants to build partnerships," said Allen.**

Q: On your first point where you were saying a university might come here not just because of access to the Advanced Test Reactor, do you see the potential for joint research with universities not necessarily in irradiations but in the post-irradiation examination portion of our capabilities?

TA: Ultimately, the focus should always be reactor technology, and the ATR and associated equipment will always be the center of the User Facility. But I know of a piece of equipment that processes material that was installed at the INL Research Center. There are very few of these in the world. Well, why not engage people in that facility to start making samples using this technology. If the technology proves to be as good as it is, the natural next step is to put materials in the reactor to see if you have an improved reactor material. If it works, you now have technology that gives you a better material.

I worry that if we say the only reason someone should ever come to Idaho is to just put something in the reactor, I think we're limiting ourselves. Somewhere down the road, I'd like to visit other laboratories and figure out where all the possible synergies are, where all the possible things are that you could leverage to improve and that eventually bring to the ATR and to the MFC (Materials and Fuel Complex).

Q: As a university professor, does that give you insight or understanding of what university researchers and nuclear engineering departments need or want in research facilities?

TA: Yes, in a couple ways. Obviously, I'm a university professor and I do research. I talk to colleagues and I understand the types of research that we do and also the types that we can't do. Most universities will struggle to be allowed to examine radioactive materials in their facilities, as they can at INL. I also understand the types of things universities are working on.

The other thing I think is important is that coming from a university, I also understand the student-centric structure under which universities do research. Regardless of what people think, professors don't do research, students do research, post docs do research. Professors do guidance; if anything, we're managers. It's important that the laboratory understand the university's context.

When we define opportunities and ways people interact with the User Facility, we need to make sure that the focus is: in this process, how do you take a student who doesn't know much about being a researcher, work with them so when they come out the other end they would be someone you trust to be a valuable at INL? We need to structure our program in a way to take advantage of what you can do at a university and what you can't, and build partnership such that the university gains and the laboratory gains. The obvious benefit for the laboratory is that these students are coming to the user facility and that allows the laboratory to evaluate, on site, these people's skill sets and determine if that's somebody you'd want to employ.

Q: Will your academic standing influence universities to come to the User Facility?

TA: I hope so, in a couple ways. One, I understand their context. When we put out solicitations and talk to the Department of Energy, it will put me in a position to help DOE understand the ways that we optimize the university interface with the User Facility and ways that are less than optimal. If the User Facility is designed so that all we ever did is take a student from the university as soon as they finished the classes, then the universities, ultimately, find themselves in a poor partnership where they are training and giving away their potential employees before they have a chance to do anything. The partnership must benefit both sides. So I understand those things.

I understand that the lab made its decision to choose a scientific director from a university. The lab is saying, "We are entrusting the leadership of this facility, which we are declaring as one of our highest priorities, to someone who works in the university community." Now the lab is sending a very strong signal to the university community that it wants to build partnerships. So, I think that apart from my understanding of the academic world, the fact that the laboratory is saying they'll give one of its premier facilities to this guy from a university is important. And it says they are willing to listen to university voices.

Q: Do you think the User Facility is going to have an impact on university nuclear programs?

TA: A lot of the university nuclear departments are already coming back. About four or five years ago, the number of students interested in nuclear engineering just took a major uptick. We are now getting students who used to go to other engineering disciplines, large numbers, really smart kids, who apparently are not biased by things in the past. Three Mile Island was something bad that happened a long time ago. In their lifetime, nuclear has been plants just turning out electricity. So, we're getting really good students. Now, given that, do I think the ATR User Facility can help? I do and in a number of ways.

If all the things I described as ways we can make INL and the User Facility a center of excellence and center for discussions, these just raise the level at which people are operating here at INL. Students and university professors, being part of that, all help that process.

It's interesting. When I was a student, when a department brought in a speaker, they'd talk about really detailed math and I was lost in five minutes. I noticed now that students love it when someone will come and talk about programmatic things - What is GNEP? Why has the U.S. started thinking about recycling again? So, when we bring the students into the environment where those kinds of discussions are not only being held, but where the people here are helping drive the national agenda, they might get engaged in that process.

I think the User Facility has an opportunity to do things that you typically wouldn't do at a university. There's a plan for summer sessions and those summer sessions are going to be putting forth information that's beyond what you typically get in the university curriculum. So it's an opportunity to upgrade what we can do on the university side.

Another idea I think would help the universities is what I'll call a reverse sabbatical. We're trying to attract university professors to come and engage with INL and do work. So, we might want to find some fraction of our staff to go back and spend a month at a university and see what they do and teach some classes. There's a lot of knowledge here the students won't typically pick up because, as a university professor, I'm not

part of that particular research agenda, that discussion. There are parts of this two-way partnership that help universities improve their curriculums.

Q: One of the things discussed when the User Facility was created a year ago was getting the nuclear industry involved. How will you approach industry to support the User Facility and partner with universities?

TA: I think it's very important to engage the nuclear industry in the User Facility. If you look right now at how the nuclear industry goes after understanding fuels and materials, either they're trying to grab archived materials or they're doing work overseas for research support.

There's an existing need for new research, which they do. But there is also the issue of extending plant life for 40 or 60 years, initiating discussions about what happens when they get to 60, can they go to 80? There's a lot of research on the agenda. Plant management, facility and component aging and managing these components are big today. So I think we need to make sure we communicate with industry and understand what their needs are. I think as we're developing these capabilities, documents and projecting our trajectory and the things we want to do, we need to understand what's important to industry.

I think as we bring on new staff to INL, we must make sure we have people with the right skill sets to respond to industry needs. If you recognize that industry needs equipment X and you buy it but no one here knows what to do with it, industry would wonder what you were doing. So our staffing is just as important as getting equipment.

I've been lucky in my career to have done some research that is relative to industry. I've also been engaged with things like the EPRI-MIT Summer School Teaching program. Each year, I've met a new set of people in that course. I've also been on the technical conference planning committees, as a technical program chair, for conferences that are industry driven, so I know a lot of those folks. It's just a question of talking to the people I know, understanding their needs, being responsive and meeting commitments. I think there's a big opportunity there.

For many years I've been attending a light-water reactor environmental degradation meeting routinely and I got asked to be on the planning committee. This assignment takes you through the assistant program chair, program chair and chair, and as part of this you meet a lot of people. And through teaching at the MIT courses, I got to meet a lot of instructors who are also important industry researchers, and the students who are typically the utility people from plants.

Q: Do you have the impression industry is interested in collaborating with universities and the User Facility?

TA: I think there's a changing dynamic. If you go back in history, you'll find industry really didn't engage with universities. Part of this is because from the industry view their problems are, shall we say, short term. They're not addressing something that needs a five-year period of study. When you talk to a university, they are looking for something that has a five-year period of study. Getting a Ph.D. is a long period in someone's life where, uninterrupted, you can think really hard about one problem. And you really want to get through that process because it helps you learn a lot about being a scientist. So, in the past, industry's view of what universities did didn't really match the industry needs. I'm not sure that was totally fair because universities have research scientists and post doctoral associates who could work with industry on shorter-term projects.

But, I think part of what's changing the industry philosophy is the manpower shifts. They're suddenly recognizing their staffs that are answering their problems are getting close to retirement age, and they somehow have to engage another set of people, and in some ways that encourages them to collaborate.

They still need to answer the questions: "Can I prove to the regulator and to myself that my materials are fine and safe and I can operate the plant to maximum capacity?" I think I see them finding other reasons that are attracting them to interact with universities. And, at the same time, universities have to recognize that they can't say they'll only accept a five-year project, which may eliminate them from the game. But if you try to use post docs and find ways to work with industry, there are natural driving forces to get them to work together.

Q: Do you think the NSUF will give them a common place to meet and develop those relationships?

TA: Yes, I do. I hope we can find ways to encourage that, even if it's proprietary research that industry is doing, it's up to them to define the program. But on the nonproprietary side we can certainly, through the solicitation process, encourage collaboration, either university to industry, university to university or university to international university. There's no reason why, if we learn that a U.S. university is studying an NGNP problem and there's another university in the United Kingdom that is studying the same thing, we shouldn't try to get them together.

Q: How will you interact with INL and ATR officials? How often will you be here?

TA: Nominally, this position is 50 percent of my time. Of course, part of this job is a little bit salesman, on the road to convince people to come here. So, by definition, I can't be here 50 percent of the time. So, a lot of it's going to have to be done using available communications. Within the User Facility structure there is a full-time staff at INL, including Mitchell Meyer and Frances Marshall - my "voices" on site that I can communicate through. And, we'll just have to be good about communicating. I'll just have to establish good working relations with my deputy and my boss, Dave Hill (INL deputy lab director for Science and Technology) to make sure I don't lose myself in the loop.

Q: On the User Facility's first solicitation for proposals, 19 proposals were submitted. For the July Summer Session, we got the target 25 participants. Does this bode well for the User Facility getting off to a good start?

TA: Yes, I think it's off to a really good start. If you look at the solicitation, it was really limited. It was our first year, short notice and with some budget uncertainty. What we basically said was, "For those of you who have an already existing project and you feel you're at a point where it would make sense to put something in the reactor, please give us a call."

We really didn't have a chance to talk to people who have a clever idea who haven't had a chance to work it to the point where they'd put it into the reactor.

If you look at those who responded to the solicitation, it's pretty much traditional nuclear engineering projects. So, there's a huge group of engineering people untapped in this process. It will be very interesting to just keep generating their interest.

It's the same thing with the summer session. It was advertised in the nuclear community with very good response on fairly short notice. I know at the University of Wisconsin, many of my students wanted to get in.

I think it bodes well for the first time and it's something we can definitely build on. I think it's critical to use our successes and start advertising them. As I mentioned earlier, invite people to INL and show them it's a good place to work. Success will build on itself.

I think DOE is very supportive of this process. They really want the ATR User Facility to work. And as they generate interest in research, it can be tied to the ATR in a logical way.

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